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U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF THE

ACTING CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY

FOR

1900.

BY

T. S. PALMER.

[FROM ANNUAL REPORTS, DEPARTMENT OF AGRICULTURE.]



WASHINGTON:

GOVERNMENT PRINTING OFFICE.

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CONTENTS.

	Page.
Work of the year.....	35
Field work	35
Economic relations of birds	37
Protection of birds	38
The Lacey Act.....	39
Belgian hares	42
Skunk farming.....	43
Publications	44
Routine work	45
Outline of work for the year 1901.....	46
Field work.....	6
Destruction of prairie dogs	46
Studies on the food of birds	47
Enforcement of the Lacey Act	47
Recommendations.....	47

REPORT OF THE ACTING CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BIOLOGICAL SURVEY,
Washington, D. C., September 1, 1900.

SIR: I have the honor to submit herewith a report of the work of the Biological Survey for the fiscal year ending June 30, 1900.

Respectfully,

T. S. PALMER,
Acting Chief.

Hon. JAMES WILSON, *Secretary.*

WORK OF THE YEAR.

During the fiscal year 1899-1900 the work of the Biological Survey has progressed along the lines indicated in former reports. Field investigations, having for their object the study of the geographic distribution of mammals, birds, and trees, and the more exact determination of the life zones of the United States, were continued; laboratory and field studies of the food of birds, especially of species of economic importance, also received much attention. Just before the close of the year the work of the Division was enlarged by the assignment of all matters relating to the importation and preservation of birds contemplated by the act of Congress, known as the Lacey Act, which went into effect on May 25, 1900. This act carried no appropriation and has therefore greatly increased the burdens of the office without making any provision for carrying out the new and important work thus imposed.

FIELD WORK.

The field work was mainly a continuation of the investigations mentioned in the report for last year, and was carried on in two States, California and Texas; in two Territories, New Mexico and Alaska; and also in Mexico, British Columbia, Manitoba, and the Northwest Territories. The work of outlining life zones in California was continued in the Coast Range and carried southward to the bay of San Francisco, under the personal direction of the chief of the Division. Some work was also done on the west slope of the Sierra Nevada during the summer of 1899, and was taken up again in the spring of the present year. During the present season a careful examination will be made of that part of the Sierra lying between Sierra Valley and the Yosemite, including the region about Tahoe, Donner, Independ-

ence, and Webber lakes. Several important problems in the distribution of mammals in this section remain to be worked out, and several zone lines will be run—one through Beckwith Pass, another from Tahoe to Placerville, and still another through the Yosemite Valley and across the range to Mono Lake. Work has now been continued in California for several seasons, and much of the northern and central part of the State has been covered, but the complicated character of the topography renders progress necessarily slow. The difficulty is further increased by inadequate appropriations, which necessitate doing the work piecemeal, and consequently extending it over several years.

In Texas special attention was given to the southern half of the State, and more particularly to the region along the Gulf coast from Corpus Christi to Brownsville and west to the lower Rio Grande below Laredo. This work was intrusted to Mr. Vernon Bailey and Mr. H. C. Oberholser, who collected data for more accurately outlining the life zones in this part of the State. Several points along the line of the Southern Pacific Railroad west of San Antonio were also visited. In this region, as well as at Henrietta, in north-central Texas, Mr. Oberholser devoted considerable time to securing information respecting the ranges of certain mammals, and also made some experiments in destroying prairie dogs by various methods.

The plans for work in Alaska last summer were successfully carried out, and a report on the biological reconnoissance of the Yukon River is now in press. Through the liberality of Mr. Edward H. Harriman, of New York, the Division is fortunately able to continue its investigations along the Alaska coast this season, thereby supplementing the work done in 1899. Mr. W. H. Osgood, who conducted the party down the Yukon last summer, has been detailed to visit several points in British Columbia and Alaska, including the Queen Charlotte Islands, B. C., Cook Inlet, Kadiak, Unalaska, and, if possible, some of the Aleutian Islands. The investigations of last summer brought to light certain problems which require special attention and also showed the localities which can be most profitably worked. While the present plans do not contemplate such detailed work as is being done in California and other parts of the United States, still the popular interest in Alaska demands that as much information as possible on the natural history of the Territory be made generally available.

A more careful study of the distribution of species found in the boreal zone along our northern border has long been needed; but in order to carry on this investigation successfully it is necessary to revisit some of the points at which the species were originally collected, and also to study their distribution in the provinces of Canada immediately adjoining the Northern United States. Plans for this work have been under consideration for several years, but it has not been possible to carry them out until this season. Through the cordial cooperation of the commissioner of the Hudson Bay Company, arrangements were made for sending a small party in charge of Mr. Edward A. Preble to the region about the southern end of Hudson Bay. The party left Winnipeg, Manitoba, about June 15 under instructions to work northward and westward to Fort Churchill, or as far as the conditions of travel or the short season would permit. Many facts of interest regarding the distribution of mammals, birds, and trees which occur in this region and in the Northern States about the Great Lakes are sure to be brought to light as a result of this expedition.

ECONOMIC RELATIONS OF BIRDS.

During the year 2,989 birds' stomachs were received and 1,989 examined in the laboratory. This is a large increase over the number received the previous year (1,381), and a slight increase in the number examined (1,961). The stomachs examined this year may be grouped as follows:

Sparrows	713	Grebes	40
Swallows	323	Catbirds	31
Woodpeckers	318	Warblers	25
Blackbirds	180	Miscellaneous	141
Flycatchers	142		
Gulls	76	Total	1,989

Nearly 50 per cent of these stomachs were those of sparrows and blackbirds, used in the completion of reports on these two groups, and nearly 25 per cent those of swallows and flycatchers, for investigations now well under way. Thus far 672 swallows' and 1,030 flycatchers' stomachs have been examined, and it is hoped that enough material may be collected in the near future to permit publication of at least a preliminary report on the food of these important birds. Some progress has also been made in other groups; 600 or 700 stomachs of thrushes and about 150 of titmice have been examined preparatory to issuing reports on these birds. The bulletin on native sparrows has been delayed in order to include interesting and valuable matter concerning the food of nestlings, methods of feeding, and results of experiments with captive birds. This report will probably appear in the near future. More than 300 woodpeckers' stomachs were examined, with a view to preparing a revised edition of Bulletin No. 7, on the "Food of woodpeckers," which has been out of print for some time, but which is still in demand.

The unusual attention which certain plume birds, notably grebes and gulls, attracted during the year suggested an investigation as to whether these species eat food fish to any extent. The stomachs of only 40 grebes and 76 gulls were available for examination, material too meager to furnish conclusive results, but interesting as showing the general character of the food. The grebes' stomachs nearly all contained feathers in greater or less quantities and very few if any fish. In fact, the fish element was largely exceeded by that of aquatic insects. The gulls selected were all Franklin's gull (*Larus franklini*), a species which breeds in the Upper Mississippi Valley, and hence is likely to be of some economic importance. These birds fed to a very slight extent on fish during the breeding season, but destroyed a remarkable number of insects, as shown by two stomachs collected at Harrison, S. Dak. One of these stomachs contained 83 beetles, chiefly predaceous, 87 bugs, 984 ants, a tree cricket, a grasshopper, and 2 spiders; the other, 16 weevils, 66 crickets, 34 grasshoppers, and several other insects. Many gulls are important as scavengers, and the economic position of these and other birds which are killed for millinery purposes, as well as of game birds of various kinds, should be more definitely known, in order that intelligent control of their destruction may be exercised. The material illustrating the food of these species is deficient; but if sportsmen and ornithologists would take the trouble to send us the stomachs of a few of the birds which they kill each year, this deficiency would soon be remedied, and the Division would be able to present results which would be of general interest. Birds' stomachs may be collected with little trouble, and blanks and directions for preserving them may be had upon application.

Field investigations designed to show the degree of selection exercised by birds in their feeding have been continued by Dr. Sylvester D. Judd and Prof. F. E. L. Beal. Several farms in the vicinity of Washington have been regularly visited by Dr. Judd during a period of several years, and 640 birds have been collected and their stomachs carefully examined with reference to the food which may be found in the immediate vicinity. As soon as a few more details of observation have been added the results will be ready for publication. Professor Beal continued the work begun last year in New England, and spent several weeks in April and May studying the food of migratory birds immediately after arrival upon their breeding grounds and before farm crops or wild fruit had matured. The unusually cold weather which prevailed during May retarded the appearance of insects, and many birds apparently found great difficulty in securing food. Many interesting observations were secured in consequence, and it was noticed that some birds, especially warblers, failed to adapt themselves to the unusual conditions, and perished in considerable numbers. Reports were also received from several observers in New Hampshire and Massachusetts showing that large numbers of birds were found dead after this cold wave.

PROTECTION OF BIRDS.

The object of investigating the food of birds is to obtain reliable information which will enable the farmer to distinguish between species which are beneficial and those which are injurious to his crops. Such knowledge naturally creates a desire to bring about an increase in the abundance of useful species, and it is very gratifying to note the widespread and constantly increasing popular interest in the question of bird protection. During the past year many inquiries have been received in regard to existing State laws on this subject, and the Division has been called upon to furnish information in connection with new game laws under consideration in Iowa, New York, Virginia, and the District of Columbia.

Last January it was reported that circulars were being distributed broadcast through the Southern States by certain millinery houses in New York City for the purpose of enlisting the assistance of postmasters in securing aigrettes and bird skins to be used for millinery purposes. The matter was referred to the Post-Office Department and attention was called to the laws of several of the Gulf States which forbid the killing of plume birds. An order was promptly issued by the Postmaster-General and published in the February number of the Postal Guide, prohibiting postmasters from aiding in the collection of such skins or in any way violating the State laws for the protection of birds.

In March a report was received from the secretary of the Pennsylvania Audubon Society to the effect that a contract had been made in Delaware for the delivery of several thousand skins of native birds to certain millinery firms, and requesting the aid of the Department in preventing the wholesale slaughter which would necessarily ensue if the terms of the contract were carried out. The Division at once communicated with the secretary of the Fish and Game Protective Association of Delaware, and through the efforts of that association and the Pennsylvania Audubon Society public sentiment was aroused to such an extent that the proposed destruction of the birds was averted.

In order to bring the various organizations concerned with the

protection of birds into closer touch with one another, a list of the State officials, national organizations, State game associations, and various Audubon societies was prepared for the Appendix of the Yearbook of the Department for 1899. At present there are State game commissions or wardens in 30 States, fish and game protective associations in 22, divisions of the League of American Sportsmen in 25, and Audubon societies in 23. This list, containing the names and addresses of the officers of the various organizations,¹ was later issued as a circular and distributed to all the commissions and associations and to other persons interested.

Still further to meet the demand for information regarding measures for the protection of birds, a compilation was made of the laws now in force in each State in the Union, so far as these relate to birds other than game. This digest was prefaced by a general discussion of bird laws and an historical résumé of the efforts thus far made to secure bird protection, from the early laws passed by New York in 1791 down to the latest laws enacted in that State and Rhode Island during the present year. It also included a review of the proposed federal legislation that has been considered by Congress during the last three years. The report was completed during the spring and issued early in June as Bulletin No. 12.

THE LACEY ACT.

For nearly three years before its final passage last spring, a bill introduced by Hon. John F. Lacey, of Iowa, having for its object federal protection of game, was under consideration in Congress. This bill, as introduced at the last session, was entitled "An act to enlarge the powers of the Department of Agriculture, prohibit the transportation by interstate commerce of game killed in violation of local laws, and for other purposes." It attracted widespread attention and received support, not only from game and fish protective associations and the League of American Sportsmen, but also from Audubon societies and bird lovers in general. It was passed by the House on April 30, by the Senate on May 18, and was approved on May 25, 1900.

This act gives the Department large powers and responsibilities. (1) It places all measures for the preservation and distribution of birds in charge of the Secretary of Agriculture, and authorizes him to expend such amounts as Congress may appropriate for this purpose. (2) It gives the Department control over the introduction of all birds and animals from foreign countries, by providing that a permit must be obtained from the Secretary of Agriculture before such animals or birds can be imported. Moreover, it prohibits absolutely the introduction of certain injurious species and such other species as the Secretary may declare injurious to the interests of agriculture. (3) It prohibits interstate commerce in birds or game killed in violation of State laws, prescribes certain regulations for the shipment of game, and fixes penalties for evasions or violations of the act. (4) It subjects song birds and game imported into a State to the restrictions of the laws of that State.

PRESERVATION AND DISTRIBUTION OF BIRDS.

The object of the Lacey Act, as stated in section 1, is "to aid in the restoration of such [game birds and other wild] birds in those parts

¹ In the case of State societies only the addresses of presidents and secretaries were given.

of the United States adapted thereto where the same have become scarce or extinct, and also to regulate the introduction of American or foreign birds or animals in localities where they have not heretofore existed." The Secretary of Agriculture is authorized to adopt such measures as may be necessary to carry out the purposes of the act, to collect and publish useful information on the propagation, uses, and preservation of birds, and to purchase game and other birds, subject to the laws of the various States and Territories.

Many persons, apparently, assume that the primary object of the law is the purchase and distribution of game birds. But its scope is in reality much broader, since it provides for the preservation of birds in general—those of interest to the farmer as well as those of interest to the sportsman. Only about 200 (18 per cent) of the 1,125 species and subspecies of birds found in North America north of Mexico can properly be considered game, and the practical limitations attending propagation, even in this comparatively small group, do not seem to be generally recognized. In general, game birds may be divided into four main groups: (1) Gallinæ or upland game birds, including quail, pheasants, grouse, and turkeys; (2) Limicolæ or shore birds, represented by plovers, snipe, woodcock, and curlew; (3) Rallidæ or rails, including meadow-hens and gallinules; (4) Anatidæ or ducks, comprising ducks, geese, and swans. Of the birds in these four groups, pheasants and a few ducks are the only ones that have thus far been successfully raised in captivity. Pheasants, grouse, and quail have been established in new localities and depleted covers have been restored by judicious distribution of wild birds at certain seasons. But to restore the normal abundance of the great bulk of game birds, including snipe, woodcock, shore birds in general, rails, swans, geese, and the majority of the ducks—in fact all migratory species—the chief reliance must be placed on protective measures, and these measures must guarantee the birds protection during the breeding season, and prevent their destruction in undue numbers during the open season. It will thus be seen that the restoration of birds by propagation or distribution is limited to narrow lines, and confined mainly to a few of the more important upland game birds which are practically nonmigratory.

Furthermore, in obtaining such birds, the Secretary is required to purchase subject to the laws of the various States and Territories. A cursory examination of these laws shows that in numerous instances States prohibit the exportation of game birds even when intended for purposes of propagation. For example, some of the States from which a supply of quail could most readily be obtained absolutely prohibit shipment of the birds for any purpose. Under these conditions the Department is somewhat limited in its ability to carry out the object of the law in so far as it relates to the purchase and distribution of game birds. But it can nevertheless do much to further the desired object by furnishing information, by cooperating with associations and individuals, or by suggesting measures which are most likely to be successful in a given locality or for a particular species.

IMPORTATION OF FOREIGN ANIMALS AND BIRDS.

In the last Annual Report attention was called to the necessity for legislation restricting the introduction of noxious animals and birds from abroad. It is gratifying to report that Congress has at length recognized this necessity, and under the Lacey act absolutely prohib-

ited the importation of the English sparrow, mongoose, starling, flying-fox, and such other species as may be declared injurious to agriculture, and has also prohibited the shipment of such species from one State to another. The importation of foreign birds and mammals is now under the control of this Department, and with a few exceptions no species can be imported except under permit from the Secretary of Agriculture. Incidentally it may be noted that the first permit was issued on June 25, exactly thirty days after the law went into effect. Domesticated birds, canaries, and parrots may be brought in without permits, and the Secretary is given authority to extend the list when necessary. It will doubtless be advisable to exempt a number of animals and all reptiles which are brought in solely for purposes of exhibition. The Secretary of the Treasury, who is authorized to make the regulations governing the importation of foreign birds and animals, has heartily cooperated in carrying the law into effect. The necessary regulations were promptly prepared in the Division of Customs and were published on June 28. Officers of the customs at all the ports of entry were notified of the provisions of the new law and were instructed to use every effort to prevent the introduction of prohibited species.

The Lacey Act is not intended to work undue hardships on importers. In the great majority of cases it can be enforced so as to cause very slight annoyance and still prevent the entry of species which may become pests. Doubtless it will be advisable to exercise control over importations in Hawaii and Porto Rico, where certain noxious species have already been introduced and where unusual interest seems to be manifested in the acclimatization of foreign birds and mammals. It is believed that this law will afford greater protection to the United States than is now enjoyed by Cape Colony, New Zealand, or any of the colonies of Australia which have similar laws. Had such an act been in force fifty years ago, the importation and consequent spread of the English sparrow could doubtless have been prevented.

INTERSTATE COMMERCE IN BIRDS KILLED IN VIOLATION OF STATE LAWS.

Nothing will do more to preserve game than the enforcement of State laws. Heretofore States have vainly prohibited the shipment of game beyond their boundaries or limited their open seasons to short periods in the autumn. As soon as the seasons closed their game was forwarded to other States or sold in distant markets without respect to season, on the plea that by such shipment it had become an article of interstate commerce, and hence was not subject to the laws of the State where offered for sale. This is now changed. The transportation provisions of the Lacey Act strike at the root of the evil by prohibiting the shipment from any State of birds or game killed in violation of local laws and by placing imported game on the same footing as birds or animals produced within the State where the game is sold. Shippers are required to mark their names, addresses, and the nature of the contents on all packages containing game, and common carriers and consignees, knowingly receiving game shipped in violation of the law, are liable to heavy penalties. Obviously the enforcement of these provisions of the law must depend largely on game wardens and other local officers, but the Department can accomplish much by furnishing information in regard to State regulations governing the export of game, open seasons, and similar matters which were formerly of local

interest, but which are now important since they form the basis of the federal law.

New interest will hereafter be given to the importance of securing uniformity in game laws, and the advantages or defects of certain State regulations will attract more attention than before. Some States already have excellent game laws, while others are notably deficient in this respect, especially in the matter of prolonging open seasons into the spring. Nothing is more destructive to the game supply in general than spring shooting. While it is perhaps impossible to fix a uniform open season, as a general rule shooting should not begin before September 1, nor extend beyond January 1. States which under any pretext permit shooting before the 1st of September, or after the 1st of January when the birds are gradually moving toward their breeding grounds, are slowly but surely paving the way for the destruction of their best game birds. So long as the seasons are open the markets remain open, and this permits the sale not only of local game, but also of that imported from other States. And if, as sometimes happens, the markets remain open after the seasons close, a premium is placed upon the destruction of game in violation of the local law or of the law of some other State.

BELGIAN HARES.

The widespread interest in Belgian hares has caused the receipt of many inquiries concerning this new industry. Correspondents usually ask for directions as to the care and breeding of the animals or addresses of reliable persons in Europe from whom breeding stock can be obtained. Many desire to know how to secure the exemption from duty (under section 473 of the tariff act of 1897) provided for other pure-bred animals, an exemption which has not thus far been granted in the case of hares.

The Belgian hare is said to have been originally brought to America by the late E. M. Hughes, of Albany, N. Y., about the year 1888. At first it attracted little attention, but since its introduction at Denver, Colo., in 1897, and at Los Angeles, Cal., a year later, its popularity has been phenomenal. This popularity has been fostered by liberal advertising. It is reported that in Los Angeles attention was first called to the advantages of the animal by the publication of an illustrated article in a local paper in the winter of 1898. This was soon followed by the importation of breeding stock from Denver and from abroad, and animals were bred in such numbers in the city that the raising of Belgian hares soon developed into an important "back-yard industry." By the close of 1899 Los Angeles had become the chief breeding place in the United States, and it was estimated that the number of Belgian hares in the State of California exceeded 50,000. The industry has been still further fostered by the organization of Belgian hare associations; by expositions held during the last three years at Denver, Colorado Springs, Kansas City, San Diego, and Los Angeles, and by a reduction in express rates. Express companies formerly charged double merchandise rates for transportation, but on July 1, 1899, reduced the tariff to a one-and-one-half rate, and on August 18, 1899, to a single merchandise rate.

The advantages claimed for the Belgian hare as a producer of meat and fur lie chiefly in the rapidity with which it increases and the ease and cheapness with which it may be raised. Breeding can be begun at an early age (6 months is the best age, according to several writers),

the period of gestation is only thirty days, and five litters may be raised in a year. The number of young is said to vary from 4 to 12, or even more, and at 3 months of age a hare may be made to dress 3 pounds, at a cost of about 5 cents per pound, while the meat brings 15 to 20 cents per pound in market. The weight of a full-grown Belgian hare, according to the American standard of excellence, is about 8 pounds, and that of a heavy-weight Belgian or Flemish giant is 11 pounds.

Recently the demand for breeding stock has been so great that it pays much better to raise hares for this purpose than for meat. Young animals less than 6 months of age have been sold at prices ranging from \$100 to \$300 apiece. As much as \$400 has been paid for an imported Belgian hare, and prize winners are held by their owners at fabulous prices. It is of course impossible to say how long such high figures will be maintained, but those who embark in the business with the expectation of realizing exorbitant prices will probably be doomed to disappointment.

As long as the animals are kept in captivity and raised chiefly in towns and cities, either for food or breeding stock, the industry is worthy only of commendation, but recent developments in California seem to show that there is an element of danger in the breeding which should not be overlooked, especially in view of the unfortunate experience which the State has already had with its native jack rabbits. As the animals increase in numbers some are sure to escape and others are turned loose, either by owners who have lost interest in their pets or those who attempt to raise hares on a large scale without taking the necessary precaution to keep them securely. This has already occurred, and, according to a recent estimate of the State board of horticulture of California, several thousand Belgian hares are already at large in the State. Should they succeed in maintaining themselves in a wild condition, and increase as readily as they do in captivity, they would undoubtedly become a source of danger. In a State whose agricultural and horticultural interests are as important as those of California, the losses which might result if the Belgian hare should become a pest would more than offset the advantages of the animal as a meat producer, and strict legislative measures might become necessary to keep it under control. Still more dangerous would such a condition be in Porto Rico, from which inquiries have also been received concerning the hare, and where it would perhaps be welcome as a new and much needed source of meat supply. It is still uncertain whether it will thrive in a tropical climate, but should it escape from captivity, as it would be almost sure to do, and once gain a foothold in the island, it would undoubtedly become a far greater pest than it ever could in California. Until more is known of the habits of the animal when liberated, there is certainly grave danger in introducing it into Porto Rico, where native carnivorous mammals and other natural enemies which might hold it in check are almost entirely wanting.

SKUNK FARMING.

Early last September an article appeared in one of the leading papers, purporting to be based on information obtained from this Department, setting forth in glowing terms the profits which could be realized by raising skunks for fur. This article was unauthorized and very misleading, but no notice was taken of it officially, in the

hope that it would not attract much attention. It was, however, given wide circulation by the press, and was reprinted a number of times, and in consequence nearly 150 letters of inquiry were received during the year in regard to the supposed new and profitable industry. Misled by the statements regarding the rapid increase of skunks, and the high prices paid for their skins, many persons seriously considered the experiment of starting skunk farms. For several years a list has been kept of such farms reported in various parts of the country, but so far as can be learned most of them have been abandoned after a year or two, and it is impossible to say how many are now in existence.

Raising fur-bearing animals for profit is not a new idea. Skunk farms, minkeries, and fox farms have been started in a number of localities, but the industry apparently has never advanced beyond the experimental stage, except perhaps in the case of the fox farms established on certain islands on the coast of Alaska during the last few years. The species raised on these islands is the Arctic or blue fox (*Vulpes lagopus*), an animal whose fur is of considerable value, and which can be raised in large numbers at slight expense. Inquiries are occasionally received as to the feasibility of raising these animals or the silver-gray fox in the Northern States, but little hope of success can be extended to such ventures. Minks and skunks breed readily in captivity, but the low price of skins makes the margin of profit rather small. Last season the highest market prices for prime black skunk skins from the Northern States ranged from \$1.65 to \$1.75 each (the average price for high-grade skins being about \$1.45), but white skins sold as low as 15 to 20 cents apiece. While there is a steady market for a considerable number of skins, the present demand can readily be supplied by skins of wild animals, and only the finest black skins from the Northern States command the highest prices. Skins which have much white, or which are obtained in the Southern States, usually bring less than a dollar each, a price which leaves little margin for profit after paying the expenses of raising the animals in captivity.

PUBLICATIONS.

The publications of the year include two bulletins, Nos. 12 and 13;¹ four numbers of "North American Fauna, Nos. 16,² 17, 18,¹ and 19;¹ one article in the Yearbook of the Department for 1899; the Report of the Division for 1899; and reprints of Bulletins No. 10, on "Life zones and crop zones;" No. 11, on "Geographic distribution of cereals;" and Farmers' Bulletin No. 54. Bulletin No. 12, on "Legislation for the protection of birds other than game birds," by T. S. Palmer, consists of a general discussion of the various topics pertaining to State and federal legislation on the subject of bird protection, and a digest of the laws now in force. Although 3,500 copies of this bulletin were published, the edition soon became exhausted and a reprint was rendered necessary. Bulletin No. 13, on the "Food of the bobolink, blackbirds, and grackles," by F. E. L. Beal, contains the results of an examination of more than 4,800 stomachs. The group of birds whose relation to the farmer and horticulturist is here shown is of great economic importance, owing to the number and size of its individuals and their wide distribution. The well-known ravages of the bobolink in the rice fields of the South, of the red-winged blackbird in the grainfields of the

¹Still in press.

²Mentioned in the report for 1899, but not distributed until October.

Mississippi Valley, and of various other members of the family in other sections of the country are given full consideration in this bulletin, which, however, also shows to what extent the havoc among cereal crops is offset by the number of noxious insects and weeds consumed by these birds as food.

Two of the four numbers of "North American Fauna" consist of technical papers, No. 17 being a "Revision of American voles of the genus *Microtus*," by Vernon Bailey, and No. 18, a "Revision of the pocket mice of the genus *Perognathus*," by W. H. Osgood. No. 16, "Results of a biological survey of Mount Shasta, California," by Dr. C. Hart Merriam, was mentioned in the report for last year. No. 19, a "Report of a biological reconnaissance of the Yukon River region," by W. H. Osgood and Dr. Louis B. Bishop, gives the results of the field work of last summer on the Yukon River, and contains full notes on the mammals and birds observed during a trip down the entire length of the river. Dr. Bishop, who accompanied Mr. Osgood as voluntary assistant, prepared the ornithological part of the report.

The contribution to the series of historical articles which appeared in the Yearbook of the Department for 1899, was entitled "A review of economic ornithology in the United States," by T. S. Palmer, and contained a summary of the advance made in the science of economic ornithology and of the application of the knowledge of birds to the affairs of everyday life.

The demand for Farmers' Bulletin No. 54, on "Common birds in their relation to agriculture," first issued in 1896, still steadily continues. During the year three reprints, aggregating 70,000 copies, were issued, bringing the total number of reprints up to nine, with an aggregate of more than 200,000 copies in four years. The bulletin has been recently translated into Bohemian and is appearing serially in the "Hospodar," a Bohemian agricultural paper published at Omaha, Nebr.

ROUTINE WORK.

Routine work still consumes much of the time of the office force. About 4,253 letters were received during the year, and many of these were accompanied by reports, schedules, and notes, which were examined and filed for future reference. About 2,041 letters were written, several hundred schedules distributed to migration observers and correspondents, and several hundred packages were received and sent out. Other office work comprises arrangement of reports and notes received from field naturalists and correspondents, preparation and examination of accounts, care of collections, unpacking and repacking specimens received for identification, forwarding supplies to field naturalists, bibliographical work, and preparation of reports and bulletins for publication. Much of the correspondence recently has consisted of inquiries in regard to the Lacey Act. Many requests are received for copies of the law, many inquiries as to the provisions regarding shipments of birds from one State to another, and many applications for permits to import foreign animals and birds. Undoubtedly this correspondence will increase in the future, and will require the entire time and attention of at least one assistant. Provision should be made for handling the additional work necessitated in replying to such inquiries and in issuing permits for the entry of foreign birds by making an increase in the salary roll of the Division.

OUTLINE OF WORK FOR THE YEAR 1901.

FIELD WORK.

The plans for field work for the current year, as already stated, comprise a continuation of the biological survey in California, a continuance of the work of outlining the life zones in Texas, a reconnaissance of the coast and islands of southern Alaska, and a reconnaissance of the Hudson Bay region. In California, the main work will be carried on in the Sierra between Lake Tahoe and the Yosemite Valley. Some collecting will be done in the northern coast ranges near Mount St. Helena to supplement the work of last season, and also in San Mateo County, below San Francisco Bay. The work in Alaska will be chiefly in the region between Cook Inlet and Unalaska. Most of this field work was well under way at the beginning of the fiscal year.

DESTRUCTION OF PRAIRIE DOGS.

The interest in the extermination of prairie dogs in some of the States on the Great Plains, especially in western Texas and eastern Colorado, emphasizes the importance of making a thorough investigation of the most economical method of destroying this pest on the ranges of the arid region. Preliminary experiments with gasoline, strychnine, and bisulphide of carbon have been made this season in the vicinity of Henrietta, Tex. Gasoline is objectionable on account of the time and trouble necessary in obtaining the materials, in properly applying it, and the danger in its use. In the strychnine experiments, a formula recommended by Prof. A. T. Peters, of the Nebraska experiment station, was used in preparing the poison. According to this formula, 3 ounces of strychnine and half a pound of cyanide of potassium are dissolved in a quart of boiling water; 2 quarts of molasses and a teaspoonful of oil of anise are then added, and after the mixture has been poured over 1 bushel of wheat, 4 pounds of finely ground corn meal are sprinkled over it and well stirred in. A tablespoonful of the poisoned wheat should be scattered about the entrance of each hole. Experiments with this preparation were tried in summer on a tract several acres in extent, and about 50 per cent of the prairie dogs were killed. The results would doubtless have been more satisfactory if the experiment had been tried in winter or early spring when the animals first come out from hibernation and before they find an abundant supply of food in the form of grass.

Bisulphide of carbon proved more satisfactory than either gasoline or strychnine, and is altogether the most effective poison. A tablespoonful of bisulphide properly applied to each occupied hole was found sufficient in the majority of cases to kill all the inmates, while if any were left a second application nearly always completed the work. These experiments show that the expense of extermination by means of bisulphide, including the cost of material and labor, is about 1 cent per hole. The number of occupied holes per acre in the vicinity of Henrietta averaged between 20 and 30, which would make the cost of extermination 20 to 30 cents per acre, as compared with about 10 cents per acre when poisoned wheat is used. In some localities the number of holes is estimated at 90 to 150, but it is doubtful whether the occupied holes ever average more than 100 per acre, and of course it is useless to apply bisulphide to any except those that are occupied.

Means should be provided for conducting these experiments on a larger scale in several different States. The main problem is to ascertain the minimum cost at which prairie dogs may be effectively destroyed under varied conditions.

STUDIES OF THE FOOD OF BIRDS.

During the ensuing year the report on the native sparrows will be completed and investigations of the food of flycatchers, swallows, titmice, and thrushes will be continued. If sufficient material can be obtained, reports on some of these groups may be prepared for publication. A study of the food of purple finches and house finches of the genus *Carpodacus* is much needed, since the house finch is considered one of the worst fruit pests in California. Some material has already been collected, but a thorough investigation will necessitate careful work in the field as well as in the laboratory.

ENFORCEMENT OF THE LACEY ACT.

Much preliminary work is necessary in ascertaining the means by which the preservation of birds under the Lacey Act may be most effectively accomplished. Regulations regarding importation must be arranged so as to relieve importers from undue annoyance and yet enable the Department to maintain a rigid inspection of species brought in from foreign countries. A brief compilation of the various State laws that relate to the seasons at which birds may be killed and the regulations under which they may be exported is greatly needed for the use of sportsmen and game dealers. Accurate information should be obtained as to the results of the introduction of Old World pheasants (both English and Mongolian) into the various States, the methods of propagation, and the special laws under which the birds are protected. An investigation of the preserves maintained by private individuals and game associations would doubtless prove very useful in coordinating the efforts now being made to increase these and other game birds.

Before the Department can advise intelligently regarding the introduction of birds, it must know the localities from which the birds can be obtained to the best advantage, and whether the localities in which it is proposed to introduce them will afford proper food, suitable conditions of environment, and adequate protection. The latter question involves investigation of the warden system of the various States and the degree to which the game laws are enforced, for evidently it is useless to import birds into a new locality if there is no prospect of preserving them until they can obtain a foothold. Popular and well-illustrated reports on pheasants and on some of the native game birds would meet a wide demand and do much to further the interests of game protection. In short, the first and most important work lies mainly along the lines of preliminary investigation and general education.

RECOMMENDATIONS.

The present appropriations are inadequate for the regular investigations already under way, and no increase has been made in the fund for biological investigations since 1894, in spite of the fact that the work of the Division has since been considerably enlarged by Congress. Under these circumstances it is impossible to carry out the provisions

of the Lacey Act as the importance of the work and public interest in it seem to require unless some appropriation is made for the purpose. A large appropriation is not necessary at this time if the work is carried on in the most economical manner in connection with the regular investigations of the Biological Survey.

In submitting estimates for the next fiscal year the following recommendations are therefore made: (1) A slight increase in the salary roll in order to bring the office force to a higher degree of efficiency and provide for the increased clerical work; (2) an increase of \$10,000 in the fund for biological investigations, to enable the Division to carry on field work on a larger scale and at the same time more economically; to investigate more fully the extermination of prairie dogs; and to collect data, prepare reports, and carry into effect regulations for the protection and importation of birds under authority of the act of Congress approved May 25, 1900.